Contents

Water Conservation/Education

When our grandparents had to draw water from the well or carry it from the creek, conservation and respect for the scarcity of water was a way of life. For two generations however, water has run from our taps as if by magic. Once again, shortages in some systems, environmental issues, social values and competing uses have brought conservation into vogue as the key to stretching local and imported supplies.

17.1 Introduction

This section discusses conservation ideas and their significance to water planning. The need for education is also addressed as an important part of any conservation program.

As this generation looks to the future from the perspectives of cultural traditions and strong economic growth, we are becoming aware of the limits water supply will impose. Water sources presently being developed are expensive. New sources will be even more costly. The time to think about and teach conservation has come.

Fortunately, water development has kept ahead of the need in modern times. For many years conservation has not been a priority of either suppliers or consumers, except during droughts. During the next generation, 25-30 years, developed supplies in some systems will become fully used and scarcity will return to some parts of the basin unless new supplies are developed.

Conversion of irrigation water to municipal and industrial uses will continue. When this conversion has reached its limits, communities will need to make a choice: Limit growth, look for additional water to import or find ways to live with less.

People can achieve significant water use reductions when they understand the reasons to conserve. Communities have shown a willingness to temporarily reduce water use during times of drought. Public education to teach the benefits of carrying out long-term water conservation programs will prepare us to support them as the need arises. A well-managed water conservation program may postpone the need for building new facilities and finding additional supplies.

In some cases, Utah water law may discourage water conservation by irrigators. Farmers who have sufficient supplies to meet crop requirements have no incentive to increase efficiency in order to use less water. Under current law, saved water cannot be used to irrigate new land, nor can it be sold to other users if downstream water right holders are adversely affected.

Water fairs in public schools teach conservation

Effective conservation programs combine measures designed to reduce the demand for water with measures to improve efficiency of delivery systems. Demand reduction measures include devices and practices employed by water users. It also includes pricing

policies that discourage overuse and provides incentives for users to save water.

A key to designing effective conservation programs is understanding the distinction between water diversion and depletion. Diversion is the amount of water diverted, or taken from a well or stream. The amount diverted must be sufficient to provide adequate water to the user after losses due to leaks, seepage and evaporation are accounted for. Depletion is water consumed and lost from the system, therefore unavailable for reuse. If a system were 100 percent efficient, diversions would equal depletions. This is almost never the case.

The goal of a conservation measure may be aimed at either diversions or depletions, or both. Exchanging a low efficiency flood irrigation system for high efficiency flood or sprinkler irrigation may reduce (conserve) water diverted while maintaining or increasing the amount of water depleted. Knowing the goal of the conservation program is necessary. If leaving more water in the river for instream flow is the objective, raising irrigation efficiency may work. This most likely will create a problem downstream, however, because total water going to some downstream users may be less. If the goal is to reduce depletions, improvements to the farmer's irrigation system may be counter productive.

Water quality is important in setting up a conservation program. If the goal is to conserve high quality water for meeting culinary growth demand, then providing a separate irrigation pipe network to substitute low quality water for lawn and garden irrigation may be a logical solution. That is if low quality water is available and costs less. The goal of conserving high quality water is met, but total water diversions and depletions may be the same or increase.

17.2 Background

Farmers and ranchers have voluntarily increased the percent of land under sprinkler irrigation to become more efficient and to increase profits. With passage of the Central Utah Project Completion Act, new conservation incentives have been added.

17.3 Water Conservation Opportunities

While much has been done to increase efficiency of water use, there are opportunities to do more. Inefficiencies can be found in several areas of water use.

17.3.1 Agricultural

Opportunities still exist to improve the conservation of water used in irrigation. Several canals in the Strawberry Water Users Association are in need of major repair. Some have been lined with concrete, but they have buckled and cracked in recent years. Some farms in this area are still flood irrigated at low efficiency in on-farm and conveyance systems. Others have fields that are laser leveled and highly efficient in on-farm water application.

17.3.2 Residential

Opportunities abound for residential water conservation. Appliances that use water efficiently are not in general use. Some private water systems charge users a flat fee for water, resulting in no incentive to use less. Water is inexpensive in most public municipal systems, and large blocks of water are provided for the initial base charges, again lessening the incentive to conserve.

17.3.3 Institutional

Institutional water could be conserved by auditing water delivery systems at parks, schools, golf courses and cemeteries. Computer monitoring and control systems are also available which can shut down a part of a system where malfunctions occur and send a warning to a central monitor. Several of these systems are now in operation. Leak detection programs may enable municipalities to reduce the water lost. Many opportunities exist to conserve treated culinary water by substituting low quality water for irrigating lawns and gardens.

Low water using plants are available to beautify landscapes in a municipal setting. When combined with state-of-the-art irrigation management systems, significant water savings can result.

17.3.4 Commercial

Opportunities for conserving water at commercial facilities are also available, but economic feasibility is questionable in some cases. Commercial laundries are moving to water conservation technologies because it also conserves energy used to heat the water. The technology is available for recycling water at commercial car washes. But public acceptance of using recycled water in commercial car wash facilities is questionable.

17.3.5 Industrial

Water is metered to all industries that are on public municipal systems. Opportunities exist for conserving water through the price structure for those on metered public systems. Water conservation will not likely be an issue for those industries on self-supplied systems until they need additional sources. Recycling and process modifications can be good water conservation alternatives.

17.3.6 Wastewater Reuse

Effluent may be used for many applications if the public accepts it. Lawn and garden irrigation, golf course watering and agricultural uses are examples. Additional treatment (tertiary) is required.

17.3.7 Methods and Strategies

Regulation may achieve water conservation objectives or incentives may be used. State law requiring cities to revise their plumbing codes and mandating all new construction will have low water using appliances and fixtures installed is an example of regulation.

Incentive programs include water pricing schedules that increase the unit costs as water use goes up. Public and private water providers should compare the cost of developing new sources with the cost of purchasing and installing low water using fixtures for their customers. The Water Conservation Credit Program contained in the Central Utah Project Completion Act is a combination of regulation and incentive programs.

Conjunctive use of water supplies, also called "joint use," is a strategy where use of surface water is coordinated with use of groundwater. Where both are available as water sources, groundwater can be allowed to accumulate during wet years, and then pumped in dry years to supplement surface water supplies. This is an excellent example of wise use because it manages the total water supply, maximizing system efficiency.

17.3.8 Conservation Impacts

The Wasatch Front Water Demand/Supply Computer Model (WFCM) was used to project future water demands using current conservation trends in Utah County. Table 17-1 shows the base case for major suppliers in Utah County where M&I water demands will increase from 107,500 acre-feet/year now to about 183,000 in the year 2020. Installing plumbing fixtures that use less water will reduce total use by almost 9 percent during the 25-year period. Adding to this, a wide acceptance of water conserving landscapes will reduce use another 2.13 percent. Increasing the price of water by 10 percent, in a way that allows consumers to save money by reducing use, conserves another 2.63 percent. Using all of the above conservation measures in combination reduces total use by about 13 percent in 2020. Some studies suggest they could reduce lawn irrigation by 50 percent with no harmful effects to the lawns or the aesthetics.

Water conservation may have negative environmental consequences. When canals are piped or lined with concrete, wetlands caused by the prior seepage will dry up.

17.4 Central Utah Project Water Conservation Credit Program

The Central Utah Project Completion Act provides strong incentives for water conservation. The objective of the conservation incentive is to increase efficiency in water use to prevent or forestall additional importation of water to the Wasatch Front metropolitan area, and to provide permanent in stream flows for fish and wildlife. Subsection 9.4.5 discusses environmental aspects of conservation.

Water management improvement studies discussed in Section 9 include a Water Conservation Credit Program as part of the Central Utah Project. The purpose of the credit program is to identify, evaluate and prioritize water conservation projects included in the *Water Management Improvement Plan*. The goal of the program is to conserve 48.389 acre-feet of water annually. Up to 65 percent of costs for each project accepted by the district may qualify for federal grants. The remaining 35 percent must come from local or state funds. Congress authorized $50 million in federal funds for this program. The Wasatch County Water Efficiency Project will use $10 million, leaving $40 million for other projects. The Central Utah Water Conservancy District will evaluate the effectiveness of the credit program annually, and may adjust any section as necessary. Project requirements and evaluations will not differ between proposed projects in any given period when two or more projects are being compared.

The district or a petitioner may retain any water they conserve, if they do not violate rules on expanding the water right. Each petitioner may make saved water available to the district. The district may make this saved water available to the Secretary of the Interior to be used as instream flows for the benefit of fish and wildlife. The secretary shall reduce the annual

Table 17-1
IMPACTS OF CONSERVATION ON M&I WATER DEMANDS FOR MAJOR SUPPLIERS IN UTAH COUNTY

Conservation Scenarios	1995	2000	Demand 2010 (ac-ft/yr)	2020	2000	Change 2010 (percent)	2020
Without Dual							
1.Base case	107,542	120,082	151,849	182,952	11.66	41.20	70.12
2.Plumbing		116,009	141,588	166,579	-3.39	-6.76	-8.95
3.Water efficient landscapes		119,805	150,226	179,023	-0.23	-1.07	-2.13
4.Price +10%		117,079	147,893	178,135	-2.50	-2.61	-2.63
5.Combination(2-4)		112,874	136,446	158,589	-6.00	-10.14	-13.32

Source: Wasatch Front Water Demand/Supply Model, April 1997

contractual repayment obligation of the district if this happens. The reduction will be equal to the project rate for delivered water, including operation and maintenance expense, for water saved for instream flow. The district shall credit or rebate to each petitioner its proportionate share of the savings.

This program contains several elements to provide a systematic approach to the accomplishment of these purposes and an objective basis for measuring their achievement. It allows the district to identify, evaluate, fund and carry out the conservation measures required to meet its goal.

Any person, group or organization with an idea for a project that conserves water is eligible to participate in the Water Conservation Credit Program. Not all projects submitted will be selected for funding and implementation. All projects must complete all elements listed in the Water Conservation Credit Program document dated July 1993. A copy may be obtained from the Central Utah Water Conservancy District.

17.4.1 Public Education

Public education is authorized as an integral part of the conservation program. The purpose is to reduce the demand for water through education. People educated about water and its many values will be better prepared to make decisions about efficient water use, conservation methods, water saving techniques and development opportunities. Education projects and programs approved under the CUPCA credit program are also eligible for 65 percent funding with federal grant monies.

17.4.2 Water Conservation Pricing

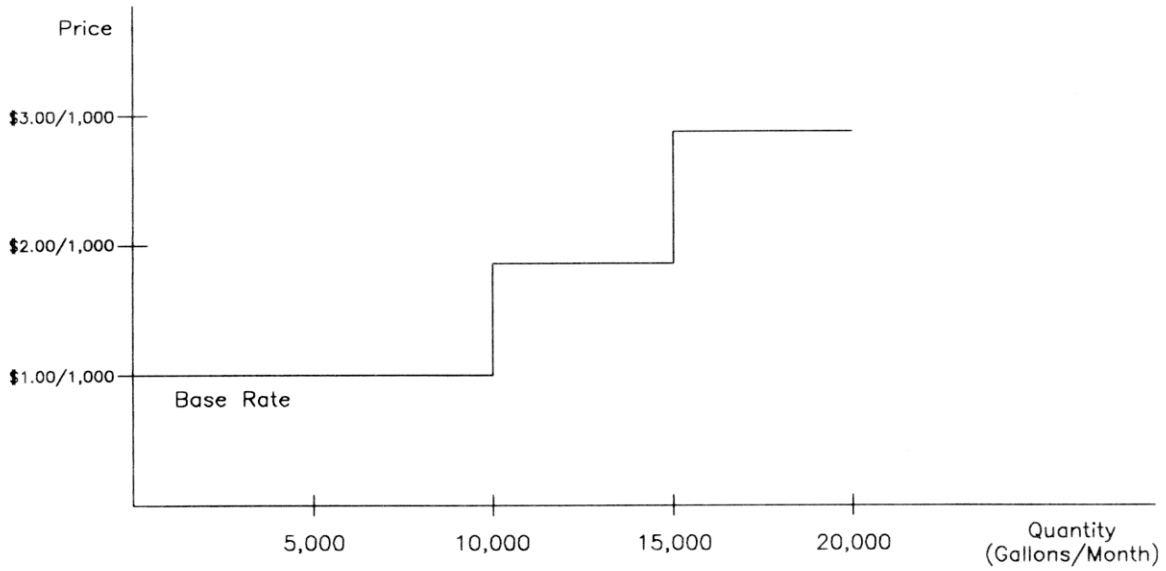
Under the Central Utah Project Completion Act, the Central Utah Water Conservancy District completed a study of wholesale and retail pricing to encourage water conservation. This study is contained in the *Report on Water Pricing Policy Study 1995*. It focused on ways to conserve water by reducing demand via various pricing mechanisms.

This study examined policies for irrigation water pricing, wastewater pricing, wholesale and retail pricing, and conservation pricing. Experiences of other water-constrained communities were also examined. The rate structures evaluated include: uniform rates, seasonal rates, drought year surcharges, increasing block rates, ratchet rates, marginal cost pricing and goal-based rates. Figure 17-1 shows an increasing block rate schedule. It shows an initial price or base rate of $1/1000 gallons for the first 10,000 gallons used each month. The next 5,000 gallons per month cost $2/1000 gallons, increasing to $3/1000 gallons for all water use exceeding 15,000 gallons per month. This water pricing policy study pointed out that changes in pricing policies are likely to gain greater public acceptance if they are phased in over time.

17.4.3 Utah Water Conservation Advisory Board

The Central Utah Project Completion Act allowed the governor to establish a nine-member board known as the Utah Water Conservation Advisory Board. The Utah Board of Water Resources was designated to be this new board, adding one board member from the environmental community. This board was staffed by the Division of Water Resources. The duty of the board was to recommend water conservation standards and

Figure 17–1
INCREASING BLOCK RATES



regulations, most of which aimed to reduce water demand. These were then recommended for promulgation by state or local authorities in the service area of each petitioner of project water. They include the following:

- All water suppliers should develop a water management and conservation plan. The Utah Board of Water Resources, Drinking Water Board and Community Impact Board should require a water management and conservation plan from all recipients of state funding for water projects.

- The Central Utah Water Conservancy District should require a water management and conservation plan as a condition for receiving funds under Section 207(b) & (e)(2) of the Central Utah Project Completion Act (PL 102-575).

- Water management and conservation plans of municipal and industrial water providers should encourage the use of water conserving landscapes for residential and commercial buildings.

- All new state facilities should have water efficient landscape designs. State landscape watering should be restricted between 10:00 a.m. and 6:00 p.m. during the summer.

- Water providers should restrict outside watering for landscapes during the hottest time of the day (e.g., 10:00 a.m. to 6:00 p.m.) during the summer.

- County and city landscape ordinances should be reviewed and revised if appropriate by local governments to promote appropriate water conserving landscapes.

- Utah's strong and growing water education program for the state's elementary school system should be continued with additional funding to assure adequate teacher training adapted to a growing student population, and develop water education materials for secondary schools and the public.

- Metering and periodic reading of meters (monthly during peak summer seasons) of municipal and industrial systems should be started by all water suppliers.

- All federal facilities in Utah should install meters on municipal and industrial connections.

- Continue using the state engineer's existing methods of measuring and reporting agricultural water at points of diversion.

- Metering of individual secondary system connections is not recommended until an economical and reliable meter is developed.

- Each municipal water provider should adopt a water pricing policy that promotes water conservation.

- Water utilities and federal funding agencies, (Bureau of Reclamation) should investigate the feasibility of mutually revising "take or pay" contracts to minimize disincentives to conservation pricing.

- City and county governments should change business license requirements for commercial laundries and other commercial facilities that use tunnel wash or large tub washer systems to require water reuse and recycling in new facilities.

- The State Department of Commerce, Division of Business Regulation and Licensing, should amend the Uniform Mechanical Code to require recycling and/or reuse in newly installed commercial and industrial water operative air conditioning and refrigeration systems.

- Amend the Uniform Plumbing Code in Utah to require new ion exchange water softeners be of the high efficiency salt demand type.

- The Department of Environmental Quality should evaluate the feasibility of using lime softening as part of the surface water treatment process as a water quality enhancement.

- The Bureau of Reclamation should investigate the cost effectiveness of lime softening at surface water treatment plants in the Colorado River drainage for water conservation, water reuse and reduction of salinity in the Colorado River Basin. They should report results of this investigation to the Colorado River Basin Salinity Control Forum.

17.5 Policy Issues and Recommendations

Two issues are discussed. These are cash flow problems and conservation strategies.

17.5.1 Maintaining Cash Flows With Conservation

Issue - Efforts to conserve water may reduce the water provider's ability to maintain adequate cash flows if they do not take precautions.

Discussion - Many water providers resist implementing effective conservation measures for fear this will reduce revenue from water sales, and jeopardize their ability to meet debt service and new capital requirements. Consequently, financial pressures cause water providers not to conserve, but seek ways to increase water sales. Effective conservation pricing of water may require revenue flows be separated from the amount of water sold. Under present pricing practices, the incentive to conserve water will only exist when population growth forces a choice between conservation and new supply development. If it costs more to develop a new supply, the provider will have an incentive to promote conservation. Ideas for alternate pricing policies can be found in Water Conservation Recommendations" from the Division of Water Resources (1995) and in *Report of the Water Pricing Policy Study* from the Central Utah Water Conservancy District (1995).

Recommendation - Agencies responsible for providing water should implement pricing practices that provide an incentive to conserve water and are revenue neutral.

17.5.2 Choosing Effective Conservation Strategies

Issue - Conservation strategies are only effective when water providers understand users' habits and practices.

Discussion - Conservation is a response to inefficient use, or a proactive effort to shape water using habits in anticipation of future shortages. To choose which conservation strategy will be successful, the water supply manager must understand human behavior. Managers need to know how customers in their specific service area respond to different climatic and social events or conditions. Otherwise, specific conservation measures may be counter productive and wasteful of scarce resources.

Cost-effective technology currently exists to accurately measure such behavior. This involves the attachment of a data logger to a home or business water meter. The logger records gallons per minute vs. time

at very short intervals (as short as every 10 seconds). The intervals are short enough to permit identification of toilet flush, shower use, dishwasher cycles and outside use. This work can be done throughout the year both in winter and summer.

Given the ability of computers to handle massive amounts of data, and new techniques for identifying patterns, municipal water providers can greatly improve their understanding of how customers use water. These techniques can also measure how innovations in water conservation might change demand patterns. This can measurably increase accuracy, improve confidence in conservation strategies, and permit better decisions on where to spend water conservation dollars.

Recommendation - Before choosing water conservation measures, water providers should conduct sufficient studies to discern and understand water users' responses to climatic and social events and conditions. ✣ ✣